

REMARKS / ARGUMENTS

I. General Remarks and Disposition of the Claims

Please consider the application in view of the following remarks. Applicants thank the Examiner for his careful consideration of this application, including the references that Applicants have submitted in this application.

At the time of the Final Office Action, claims 1, 3-5, 10-14, 21, 24-29, 100-106, 111-127, 130-145, 147, 149-151, and 155-157 were pending in this application. Claims 100-106, 111-126, 133-136, 142, 143, 149-151, and 155-157 were withdrawn from consideration. Claims 1, 3-5, 10-14, 21, 24-29, 127, 130-132, 137-141, 144, 145, and 147 were rejected in the Office Action. By this paper, claims 1 and 127 have been amended. No new matter has been added to the application in view of the claim amendments. All the amendments are made in a good faith effort to advance the prosecution on the merits of this case. It should not be assumed that the amendments made herein were made for reasons related to patentability. Applicants respectfully request that the above amendments be entered and further request reconsideration in light of the amendments and remarks contained herein.

II. Remarks Regarding Rejections Under 35 U.S.C. § 103(a)

Claims 1, 3-5, 10-14, 21, 24-29, 127, 130-132, 137-141, 144, 145, and 147 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,335,794 issued to Bond (hereinafter "*Bond*"), or U.S. Patent No. 5,711,376 issued to Sydansk (hereinafter "*Sydansk*"), in view of PCT Application Publication No. WO 03/056130 to Couillet *et al.* (hereinafter "*Couillet*"). With respect to this rejection, the Final Office Action states:

Bond discloses a secondary recovery process for recovering oil from a subterranean formation by first injecting a fracturing fluid via an injection well to said formation at a pressure that forms formation fractures; adding a surfactant and a "slug" of an ["aqueous fluid" in about an equal amount to the injected fracturing fluid to displace the fracturing fluid to a distance between the injection well and a production well; and adding a "driving fluid" (diverting fluid) that can be aqueous water or brine to displace the fluids from the vicinity of the injection well to a second zone encompassing the production well. (Col. 1, lines 10-24; col. 4, line 49 to col. 5, line 26; col. 5, lines 36-55; Example in col. 6, lines 13-48; claims 1, 3 and 11)

Similarly, Sydansk discloses a process for enhancing oil recovery, wherein the process includes fracturing a subterranean

formation in communication with a producing well, wherein the process comprises injecting into said formation via a well an aqueous foamed fracturing fluid comprising a polymer at a pressure sufficient to induce formation fractures; wherein the foam gas "energizes" the fluid and (when the pressure is decreased by, e.g., producing fluids) the gas expands and drives much of the liquid component of the fracturing fluid out of the fracture and to any zone of an adjacent formation that the fluid has penetrated (such as a producing well). (Abstract; col. 2, lines 9-24; col. 4, line 33; col. 6, lines 37-48; col. 8, lines 40-51)

However, neither Bond nor Sydansk disclose their respective fracturing fluid to comprise a hydrophobically-modified chitosan compound.

On the other hand, Couillet teaches a method for fracturing/treating a subterranean formation to substantially alter the fluid flow (permeability) and/or surface characteristics of the formation, said method including injecting into the formation an aqueous fracturing viscoelastic composition containing a water-soluble hydrophobically-modified polymer having hydrophobic chains of approximately 12-24 carbons and a molecular weight between 10,000 and 10,000,000 g/mol. (Abstract; page 1, lines 1-24; page 4, line 10 to page 5, line 22; page 8, lines 26-32; page 11, line 28 to page 12, line 19; page 13, lines 5-9; page 19, lines 18-32; *See, e.g.*, Examples 12-14 disclosing studies of the leak properties (fluid-loss permeability) of sample drilling fluids)

Couillet further teaches that the polymer backbone can be a polysaccharide or a derivative thereof, such as chitin or chitosan, having a molecular weight around 100,000 to 500,000 g/mol; wherein the chitosan can be modified via an acylation reaction (i.e. formed by an alkylation reaction of a chitosan hydrophilic backbone involving an alkali halide, such as an alkyl chloride). (Page 12, line 21 to page 13, line 31; *See* Example 10 and Figures 15-16 disclosing a drilling fluid comprising from about 1 to 10% modified chitosan having an 11-carbon hydrophobic side chain)

Examiner notes that Couillet teaches chitin, chitosan and modified chitosan via acylation/alkylation with an alkyl halide as a polymer compound added to the formation. (*See*, instant claims 5 and 6 reciting chitosan and alkyl halide as the hydrophilic polymer and hydrophobic compound, respectively.) Consequently, Couillet is disclosing using in the method of treating a formation a RPM polymer compound as encompassed by the instant claims with "sufficient specificity".

Moreover, Couillet teaches that this viscoelastic-surfactant based fracturing fluid imparts a minimal pressure drop in the pipe

within the wellbore during displacement; has a minimal leak-off rate to avoid fluid migration into the formation rocks that may prevent produced hydrocarbons to flow into the wellbore; has a relatively low friction pressure; and is "responsive" in that it degrades to a low viscosity fluid when in contact with produced formation fluids during backflow from the reservoir to the wellbore.

Therefore, it would have been obvious to one in the art at the time that the claimed invention was made to use the fracturing fluid taught in Couillet that comprises a hydrophobically-modified chitosan compound as the fracturing fluid component in the injection treatment processes disclosed in Sydansk or Bond. It would have been obvious to one skilled in the art to do so because this fracturing fluid would impart enhanced properties to the resultant processes, such as minimal pressure drop in the pipe during displacement; minimal leak-off rate to avoid fluid migration into the formation rocks to prevent produced fluid loss; relatively low friction pressure; and be "responsive" to produced formation fluids, as taught by Couillet.

Although Couillet may not expressly disclose "diverting at least a portion of the aqueous injection fluid to another subterranean zone" as recited in independent claim 1, Couillet teaches treating a formation with the same relative permeability modifier (RPM) polymer compound as encompassed by the instant claims and thereby should possess the same physical properties/effects. Accordingly, the RPM used in the method disclosed in Couillet should "divert" a portion of the fluid to another surface of the subterranean formation upon the addition of said RPM polymer compound in Couillet's method of treating/fracturing a formation because said RPM disclosed in Couillet is encompassed by that recited in the instant claims.

Thus, the claims are unpatentable over Bond or Sydansk, either in view of Couillet.

(Final Office Action at 4-7.) Applicants respectfully disagree.

In order for a reference or combination of references to form the basis for a rejection under § 103(a), a *prima facie* case of obviousness must be established. Obviousness is determined by construing the scope of the prior art, identifying the differences between the claims and the prior art, determining the level of skill in the pertinent art at the time of the invention, and considering objective evidence present in the application indicating obviousness or nonobviousness. *Graham v. John Deere*, 383 U.S. 1, 17 (1966). Applicants respectfully submit that due to the differences between the claims as currently amended and the cited

references the Examiner has not established a *prima facie* case of obviousness, in that the combination of *Bond* and *Couillet* and the combination of *Sydansk* and *Couillet* do not teach each and every recitation of the present claims.

With respect to independent claims 1 and 127, as amended, neither *Bond* nor *Sydansk* teach “wherein the hydrophobically modified water-soluble polymer . . . comprises a polymer backbone and a hydrophobic branch, the hydrophobic branch comprising an organic acid derivative selected from the group consisting of: an anhydride of octenyl succinic acid, an ester of octenyl succinic acid, an amide of octenyl succinic acid, an anhydride of dodecenyl succinic acid, an ester of dodecenyl succinic acid, and an amide of dodecenyl succinic acid.” There is no disclosure in *Bond* or *Sydansk* of Applicants’ claimed hydrophobically modified water-soluble polymer, much less a hydrophobically modified polymer comprising a hydrophobic branch comprising an organic acid derivative. See *Bond* and *Sydansk*, entire disclosures. Indeed, the Examiner notes “neither *Bond* nor *Sydansk* disclose their respective fracturing fluid to comprise a hydrophobically-modified chitosan compound.” (See Office Action at 4.)

Rather, the Examiner is relying upon *Couillet*’s alleged disclosure of hydrophobically modified compounds to teach the hydrophobically modified water-soluble polymers of Applicants’ claims. (See Office Action at 6.) However, to the extent that *Couillet* may disclose a hydrophobically modified water soluble polymer, *Couillet* fails to disclose a hydrophobically modified water-soluble polymer with hydrophobic branch comprising “an organic acid derivative selected from the group consisting of: an anhydride of octenyl succinic acid, an ester of octenyl succinic acid, an amide of octenyl succinic acid, an anhydride of dodecenyl succinic acid, an ester of dodecenyl succinic acid, and an amide of dodecenyl succinic acid comprising a hydrophobic branch comprising an organic acid derivat.” Although *Couillet* may disclose hydrocarbon chains comprising a “degradable group such as an acetal, an amide, an ether or an ester bond,” *Couillet* fails to disclose that these hydrocarbon chains comprise an anhydride, ester, or amide of octenyl succinic acid or of dodecenyl succinic acid. See *Couillet*, page 13, lines 5-9. Nor has the Examiner provided any motivation to modify any of these references to teach this limitation.

Therefore, Applicants respectfully assert that independent claims 1 and 127 and their dependent claims are not obviated by the combination of *Bond* and *Couillet* or by the

combination of *Sydansk* and *Couillet*. Accordingly, Applicants respectfully request withdrawal of this rejection with respect to claims 1, 3-5, 10, 12-14, 21, 24-29, 127, 130-132, 137-141, 144, 145, and 147.

III. Request for Rejoinder of Withdrawn Claims

Claims 100-106, 111-126, 133-136, 142, 143, 149-151, and 155-157 have been withdrawn from consideration. Withdrawn claims 100-105, 150, and 156 depend from independent claim 1. Withdrawn claims 133-136, 142, 143, 151, and 157 depend from independent claim 127. Withdrawn claims 111-126, 149, and 155 depend from withdrawn independent claim 106. Accordingly, once the Examiner determines that the present independent claims are allowable, Applicants request rejoinder of the withdrawn claims, including examination of the formerly nonelected species on the merits. In addition, because independent claims 1 and 127 are in condition for allowance for the reasons stated above, Applicants respectfully submit that claims 100-105, 133-136, 142, 143, 150, 151, and 157 are also in condition for allowance. Therefore, Applicant requests that the Examiner provide an indication of allowance for claims 100-105, 133-136, 142, 143, 150, 151, and 157.

IV. No Waiver

All of Applicants' arguments and amendments are without prejudice or disclaimer. Additionally, Applicants have merely discussed example distinctions from the cited references. Other distinctions may exist, and Applicants reserve the right to discuss these additional distinctions in a later Response or on Appeal, if appropriate. By not responding to additional statements made by the Examiner, Applicants do not acquiesce to the Examiner's additional statements, such as, for example, any statements relating to what would be obvious to a person of ordinary skill in the art.

SUMMARY

In light of the above amendments and remarks, Applicants respectfully request reconsideration and withdrawal of the outstanding rejections. Applicants further submit that the application is now in condition for allowance, and earnestly solicit timely notice of the same. Applicants respectfully request that the examiner issue an Advisory Action if the examiner does not find the claims to be allowable in light of the remarks made herein. Should the Examiner have any questions, comments or suggestions in furtherance of the prosecution of this application, the Examiner is invited to contact the attorney of record by telephone, facsimile, or

electronic mail.

Applicants believe that no fees are due in association with the filing of this Response. Should the Commissioner deem that any fees are due, including any fees for extensions of time, the Commissioner is authorized to debit Baker Botts L.L.P. Deposit Account No. 02-0383, Order No. 063718.0331, for any underpayment of fees that may be due in association with this filing.

Respectfully submitted,



Larissa Piccardo
Registration No. 60,448
BAKER BOTTS L.L.P.
One Shell Plaza
910 Louisiana
Houston, TX 77002
Telephone: 713.229.1465
Facsimile: 713.229.7765
Email: larissa.piccardo@bakerbotts.com

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